

REMARKS/ARGUMENTS

Claims 1-3, 5-19 were pending and all of which were rejected. No amendments are made herein. Thus, no additional search or new consideration is required. Reconsideration is respectfully requested.

Applicant notes that in the previous Response to Office Action, dated August 27, 2008, claim 6 was inadvertently labeled "Currently Amended" although no amendments were made to claim 6. The present Response to Office Action correctly labels claim 6 as "Original".

Claim Rejections – 35 U.S.C. §102

Claims 1-3 and 5-13 were rejected under 35 U.S.C. §102(b) as being anticipated by Higgs (WO 02/29883 A1) ("Higgs"). Reconsideration is respectfully requested.

Applicant notes that in the rejection, the Examiner cites to paragraph numbers in Higgs, but Higgs does not have paragraph numbers. Applicant believes the Examiner is obtaining the paragraph numbers from the corresponding US publication (i.e., 2004/0106217). Applicant requests that, for the sake of clarity and consistency in the rejections, the Examiner cite to the referenced document in a consistent manner, e.g., by page and line number in the referenced Higgs PCT application.

Applicant requests reconsideration of the present rejection as the rejection of the claims (1) lacks a factual basis; and (2) no *prima facie* case has been made.

Lack of Factual Basis

Claim 1 recites "annealing a semiconductor structure to diffuse contaminants from a surface particulate into the semiconductor material".

In the rejection of claim 1, the Examiner stated that Higgs discloses annealing at Figs. 1-4, page 17. Applicant respectfully disagrees. Page 17 of Higgs is related to a "Method for imaging" and describes exciting a wafer that has been contaminating with copper using a laser from which photoluminescence (PL) images are obtained, which are shown in Figs. 1 to 4. Thus, Page 17 and Figs. 1-4 of Higgs discloses exposing the wafer to a light beam to produce photoluminescence, and does not teach or suggest "annealing".

The Examiner attempts to support the position that Higgs' disclosure of illuminating the wafer with a laser beam is annealing stating "annealing (excited using laser excitation (to increase the energy (i.e., heat or power of semiconductor))(Annealing = a heat treatment that alters the microstructure of a material (i.e., a semiconductor such as glass) causing changes in properties such as strength and hardness) and contaminated, and then/after the levels of contamination is confirmed detected or determined for different images". In fact, however, Higgs does not disclose or even suggest that the laser is used to anneal the wafer. For example, Higgs does not discuss a desire or need for annealing the wafer. Moreover, Higgs does not discuss whether the laser could possibly heat the wafer sufficiently to anneal the wafer. Further, Higgs explicitly states that the use of the laser is to excite the wafer "from which the average PL signal was calculated. PL maps were obtained."

There is no factual support for the Examiner's rejection in that the use of the laser described on page 17 of Higgs does not teach or suggest annealing the wafer, but instead is to excite the wafer to produce photoluminescence. Applicant submits that to ignore this fact is an error. Applicant respectfully requests that the Examiner reconsider the lack of factual basis for this rejection.

No Prima Facie Case

Claim 1 recites "annealing a semiconductor structure ..." and "after annealing the semiconductor structure, exposing the surface of the semiconductor structure ... to at least one high-intensity beam of light from a suitable light source; collecting photoluminescence produced by excitation of the semiconductor structure by the light beam". Thus, the method of claim 1 requires both "annealing" and "exposing" the semiconductor structure to a light beam that produces photoluminescence that is collected. The act of "exposing" the structure with a light beam must be separate from the act of annealing, as claim 1 explicitly recites that exposing to light is performed "after annealing".

The Examiner cited to page 17 of Higgs as disclosing the act of "annealing", as discussed above, and cited to the lasers (3-8) in Fig. 5 and paragraphs 0045-0046 (which Applicant believes corresponds to page 11, line 25 to page 12, line 11 of Higgs) as disclosing "after annealing the semiconductor structure, exposing the surface of the semiconductor structure ... to at least one high-intensity beam of light". The paragraph that starts at page 11, line 25 of Higgs, however, refers to a "PL imaging microscope which: towards the right hand

side, comprises a bank of lasers 3-8". The lasers 3-8 produce the excitation beam that produces the photoluminescence. See, page 13, line 22-page 15, line 1.

Thus, the Examiner is citing to two separation portions of Higgs that describe the same feature, i.e., the laser that produces the excitation light beam which is used for photoluminescence imaging. Accordingly, Higgs does not disclose both "annealing", and "after annealing ... exposing the surface ... to at least one high intensity beam of light". If one were to accept the Examiner's position that the laser is used to anneal the wafer,¹ then there is no disclosure of using the same laser "after annealing ... exposing the surface ... to at least one high intensity beam of light" to produce photoluminescence. Conversely, if the laser of Higgs is considered to be used for "exposing the surface ... to at least one high intensity beam of light" to produce photoluminescence,² then there is no disclosure of the act of annealing. Either way, at least one element of claim 1 is not disclosed in Higgs and thus, a *prima facie* case has not been made.

Additionally, Applicant notes that claim 1 further recites "comparing the result ... to identify unacceptable contamination levels resulting from diffusion of contaminants from the surface particulate into the semiconductor structure". The Examiner cited to various portions of Higgs stating that Higgs discloses "inspecting for one or more regions of enhanced PL intensity identifying potential front side or back side diffusable metal contamination; and verifying by additional tests", which is from page 10, lines 26-28 of Higgs. The Examiner is ignoring the fact that Higgs is attempting to identify "potential" diffusible metal contamination, while claim 1 recites "identify unacceptable contamination levels resulting from diffusion of contaminants", i.e., actual diffusion that has occurred from the annealing step. Higgs does not disclose or contemplate annealing, and therefore is attempting to identify "potential" diffusible contamination. Claim 1, on the other hand, includes the feature of annealing and, therefore, can identify the actual diffusion of contamination.

Thus, Applicants respectfully submit that claim 1 is patentable over Higgs. Reconsideration and withdrawal of this rejection is respectfully requested. Claims 2-3 and 5 depend from claim 1 and are, therefore, likewise patentable for at least the same reasons.

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¹ As discussed, above, Applicant does not accept this proposition.

² Higgs explicitly discloses using the lasers 3-8 for this act.

Originally filed independent claim 6 recites “a heating step to the semiconductor to diffuse contaminant from the particle into the semiconductor material;” “a second step of collecting photoluminescence produced by like method to the first to produce a second photoluminescence result representative of the intensity of the photoluminescence response as above described after annealing”.

The rejection of claim 6 suffers from the same deficiencies discussed above in reference to claim 1. There is no factual basis to support the position that the use of the laser is Higgs teaches or suggests “a heating step to the semiconductor to diffuse contaminant from the particle into the semiconductor material”. The only disclosure in Higgs is that the laser is to excite the wafer to produce photoluminescence. Moreover, as discussed above, the Examiner is relying the same feature of Higgs as disclosing different features of the claims, and thus, a *prima facie* case has not been made. Further, Higgs does not disclose the collecting photoluminescence twice, once before and once after the “heating step to the semiconductor to diffuse contaminant from the particle into the semiconductor material” as recited in claim 6.

Thus, Applicants respectfully submit that claim 6 is patentable over Higgs. Reconsideration and withdrawal of this rejection is respectfully requested. Claims 7-8 depend from claim 6 and are, therefore, likewise patentable for at least the same reasons.

Claim Rejections – 35 U.S.C. §103

Claims 14, 15, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Higgs in view of Maris (2002/0054295) (“Maris”). Reconsideration is respectfully requested.

Independent claim 14 recites “means to heat the sample under test associated with the support to diffuse contamination from a particulate into a semiconductor structure of the sample under test”.

The Examiner cites to Higgs as disclosing annealing and states that Higgs is silent as to the “means to heat the sample under test associated with the support” and relies on Maris for this feature. The rejection of claim 14 suffers from the same deficiencies discussed above in reference to claim 1. There is no factual basis to support the position that the use of the

laser is Higgs teaches or suggests annealing. The only disclosure in Higgs is that the laser is to excite the wafer to produce photoluminescence. Moreover, as discussed above, the Examiner is relying the same feature of Higgs as disclosing different features of the claims, and thus, a *prima facie* case has not been made.

With respect to Maris, the Examiner states “Maris is from the same field of endeavor teaches a heating means embedded in a sample state for anneal process”. Applicant respectfully disagrees. Contrary to the Examiner’s statement, Maris does not disclose or suggest using the heat source for annealing, i.e., diffusing contamination from a particulate into a semiconductor structure of the sample under test. The sample heat source in Maris is for “temperature dependent measurements”. Paragraph 0039. While Maris does discuss annealing, it is in the context of using the measurement to determine whether a film has been annealed properly, as opposed to using the disclosed heat source annealing, as opposed to controlling the temperature of the sample during measurements. See paragraph 0095.

Thus, neither Higgs nor Maris disclose a “means to heat the sample under test associated with the support to diffuse contamination from a particulate into a semiconductor structure of the sample under test”. Even if Higgs were to be combined with the disclosure of Maris, the result would be the Higgs photoluminescence imaging device that includes a heat source for temperature dependent measurements. Accordingly, a *prima facie* case has not been met.

Thus, Applicants respectfully submit that claim 14 is patentable over Higgs and Maris. Reconsideration and withdrawal of this rejection is respectfully requested. Claims 15 depends from claim 14 and is, therefore, likewise patentable for at least the same reasons.

Claim 17 was also rejected over Higgs in view of Maris, but claim 17 depends from claim 16, which was not rejected over Higgs in view of Maris and must therefore be considered patentable over Higgs and Maris. Applicant submits that claim 17 is patentable over Higgs in view of Maris for at least the same reasons that claim 16 is considered patentable over Higgs in view of Maris.

Claims 16, 17, 18, and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Higgs in view of Noguchi et al. Reconsideration is respectfully requested.

Independent claim 16 recites “heating means to heat the sample in situ, allowing a photoluminescence response to be measured before and after heating, and a comparator to

compare the said two photoluminescence responses to determine the difference and obtain an indication of rates of diffusion so as to identify the contaminant".

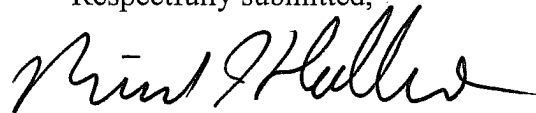
As discussed above, Higgs does not teach or suggest heating the sample. Noguchi discloses a heated stage that is only "to control the specimen temperature to 140°" during the measurement of the specimen. Col. 8, lines 30-49. Neither Higgs nor Noguchi teach or suggest measuring the sample **before and after** heating as recited in claim 16. Thus, this claim feature is not disclosed in either reference and therefore a prima facie case has not been made.

Moreover, Higgs fails to disclose determining the difference in the before and after photoluminescence responses "to obtain an indication of rates of diffusion so as to identify the contaminant". As discussed above, Higgs discloses inspecting for one or more regions of enhanced PL intensity identifying potential front side or back side diffusable metal contamination; and verifying by additional tests", which is from page 10, lines 26-28 of Higgs. Higgs does not disclose or contemplate annealing, and therefore is attempting to identify "potential" diffusible contamination, not actual diffusion that occurs from annealing. Thus, there is no disclosure in Higgs of a "comparator to compare the said two photoluminescence responses to determine the difference and obtain an indication of rates of diffusion so as to identify the contaminant" as recited in claim 16.

Accordingly, Applicants respectfully submit that claim 16 is patentable over Higgs in view of Noguchi. Reconsideration and withdrawal of this rejection is respectfully requested. Claims 17-19 depend from claim 16 and are, therefore, likewise patentable for at least the same reasons.

No amendments are made herein and claims 1-3, 5-19 remain pending. For the above reasons, Applicants respectfully request allowance of all pending claims. Should the Examiner have any questions concerning this response, the Examiner is invited to call the undersigned at (408) 378-7777 ext 112.

Respectfully submitted,



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